BINARY SYSTEM 6086 VRCHLICKY

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Photometric observations of main-belt asteroid 6086 Vrchlicky show its binary nature with an orbital period of 22.61 ± 0.01 h. The rotational lightcurve of the primary has a period of 2.7674 ± 0.0001 h with an amplitude of 0.07 mag at solar phases 1-12 degrees. A lower limit on the secondary-to-primary mean-diameter ratio is 0.22 ± 0.02. The measured absolute visual magnitude in R band is 12.03 ± 0.03 mag and the slope parameter is 0.20 ± 0.05.

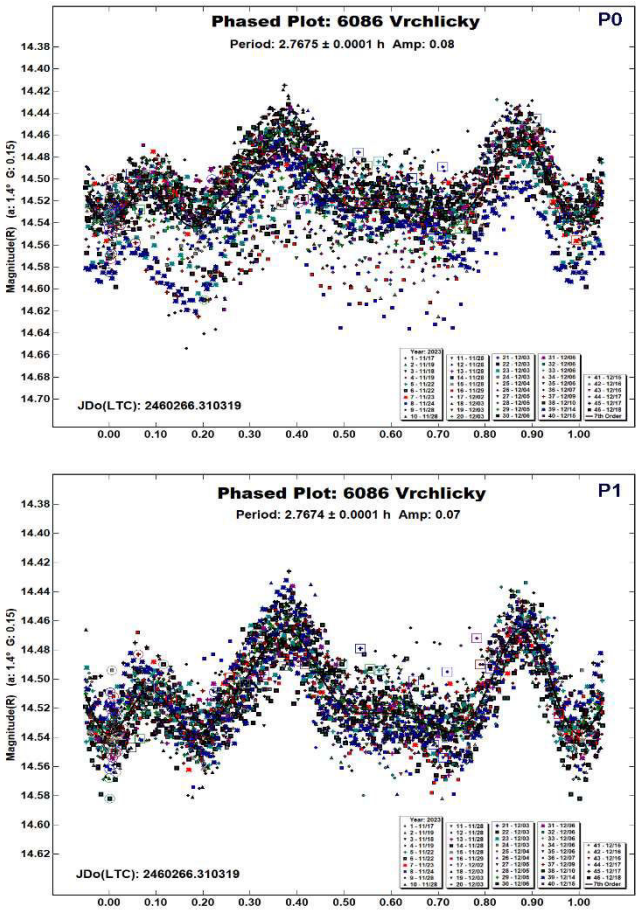
6086 Vrchlicky is a Sl-type (Bus and Binzel, 2002) middle main-belt asteroid, selected as target of the photometric campaign of the Italian Amateur Astronomers Union (UAI, 2023) for the period 2023, October-December.

Collaborative CCD observations were carried out over the period spanning from 2023, November 17 to 2023, December 18, using the instrumentation described in the Table II. The first two sessions, acquired by A. Marchini, R. Papini (K54) and by N. Montigiani, M. Mannucci (A57) on 2023, November 17-18 showed some anomalous attenuations which let us to hypothesize its binary nature. The photometric data by A. Pál et al. (2020), downloaded from the lightcurve database (LCDB; Warner et al., 2009), confirmed that hypothesis, when analyzed with the dual-period search function. Due to the cloudy weather in Italy, it was decided to also extend the collaboration to the BinAst observer group led by P. Pravec.

Lightcurves analysis was done with *MPO Canopus* (Warner, 2023). All the images were calibrated with dark and flat frames and converted to standard magnitudes using solar colored field stars from CMC15 catalogue.

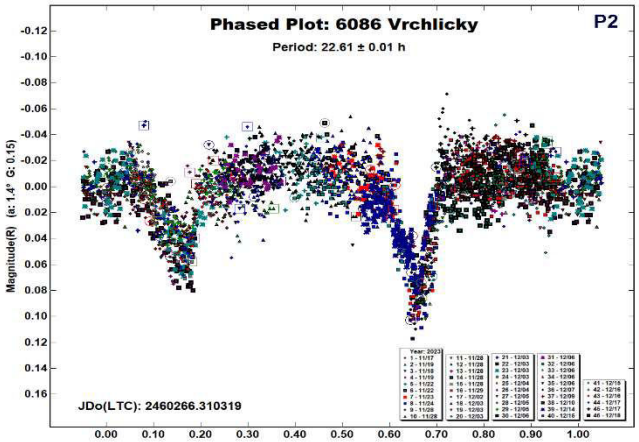
The analysis was done using the dual-period search function implemented in MPO Canopus. We found a primary synodic rotational period of P1 = 2.7674 ± 0.0001 h with an amplitude A1 = 0.07 ± 0.01 mag at solar phases 1-12 degrees and an orbital period P2 = 22.61 ± 0.01 h. The deep drop of the secondary eclipse, 0.05 ± 0.01, gives a lower limit on the secondary-to-primary mean-diameter ratio Ds/Dp of 0.22 ± 0.02. The binary nature of this asteroid was announced by the authors through the CBET 5366 (Franco et al., 2024), published on Mar 11, 2024.

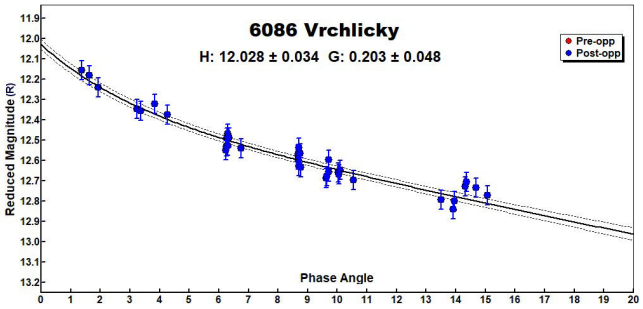
The H-G parameters were found with the function implemented in *MPO Canopus*, using the average R mag of each session, considering the small amplitude of the lightcurves. We found H_R = 12.03 ± 0.03 mag and G = 0.20 ± 0.05.



Number	Name	2023 mm/dd	Phase	L_{PAB}	B_{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
6086	Vrchlicky	11/17-12/18	1.3,15.1	55	-1	2.7674	0.0001	0.07	0.01	MB-M
						22.61	0.01	0.08	0.01	

Table I. Observing circumstances and results. The first line gives the results for the primary of a binary system. The second line gives the orbital period of the satellite and the maximum attenuation. The phase angle is given for the first and last date. If preceded by an asterisk, the phase angle reached an extrema during the period. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude/latitude at mid-date range (see Harris et al., 1984). Grp is the asteroid family/group (Warner et al., 2009).





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Observatory (MPC code)	Telescope	CCD	Filter	#Sessions
Sopot Observatory (K90)	0.35-m SCT f/6.3	SBIG ST-8 XME	C	7
Shed of Science South Observatory (V61)	0.50-m CDK f/4.4	FLI ML4710	C	7
Schiaparelli Observatory (204)	0.84-m NRT f/3.8 0.36-m SCT f/7.5	STT-3200 (3×3) Atik 16200 (bin 3×3)	C	6
GiaGa Observatory (203)	0.36-m SCT f/5.8	MORAVIAN G2-3200	C	6
San Marcello Pistoiese Observatory (104)	0.60-m NRT f/4.0	Apogee Alta	Rc	5
Osservatorio Astronomico Margherita Hack (A57)	0.35-m SCT f/8.3	SBIG ST10XME (bin 2×2)	Rc	4
Astronomical Observatory, University of Siena (K54)	0.30-m MCT f/5.6	SBIG STL-6303e(bin 2×2)	C	3
Osservatorio Astronomico Nastro Verde (C82)	0.35-m SCT f/6.3	SBIG ST10XME (bin 2×2)	C	3
Beppe Forti Observatory (K83)	0.40-m RCT f/8.0	SBIG ALUMA 4040	C	2
Iota Scorpii(K78)	0.40-m RCT f/8.0	SBIG STXL-6303e (bin 2×2)	Rc	2
M57 Observatory (K38)	0.35-m RCT f/5.5	SBIG STT1603ME	C	1

Table II. Observing Instrumentations. CDK: Corrected Dall-Kirkham, MCT: Maksutov-Cassegrain, NRT: Newtonian Reflector, RCT: Ritchey-Chretien, SCT: Schmidt-Cassegrain.